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LISTS OF SPECIES

Checklist of Sapotaceae in Northeastern Brazil

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ABSTRACT: The Sapotaceae are a pantropical family of flowering plants composed of approximately 1,250 species. In Brazil, the Sapotaceae are represented by 11 genera and 231 species, 86 of which have been registered in the region of northeastern Brazil. This paper provides a checklist of the Sapotaceae species that occur in a major portion of northeastern Brazil, and aims to document the number of native taxa, update their currently accepted names, and contribute to the Flora of Brazil (Lista de Espécies da Flora do Brasil). Additional information about regional geographic distribution, biomes of occurrence, IUCN status, and vernacular names are provided for each species. A total of nine genera and 46 species were documented and the majority (64%) is restricted to the Atlantic Rainforest. The current study provides an important contribution to our knowledge of the Sapotaceae in the Atlantic Rainforest biome.

INTRODUCTION

The Sapotaceae consist of 58 genera and about 1,250 species in subtropical and tropical regions of the world (Pennington 1991; Govaerts *et al*. 2001; Swenson *et al*. 2007a, b). Pennington (1990) produced a monograph of neotropical members of the family, followed by a revised generic classification (Pennington 1991).

The center of diversity of Sapotaceae is in the Neotropics, where the majority of species occur in moist lowland forests (Pennington 2006). In Brazil, Carneiro *et al*. (2012) documented 11 genera and 231 species of Sapotaceae, of which 86 species are registered in the region of northeastern Brazil.

Despite its high ecological and taxonomic importance, species of Sapotaceae in northeastern Brazil are usually cited as part of local or regional floristic or ecological studies (Alves-Araújo *et al*. 2008; Lemos *et al*. 2010), however few checklists or taxonomic surveys have been published (Almeida Jr. 2010; Alves-Araújo and Alves 2010). The total number of species in Brazil is likely underestimated due to numerous existing difficulties with species-level taxonomy.

This study aims to provide an updated list of Sapotaceae species that occur in a large portion of northeastern Brazil. Value-added information about the distribution and ecology of each species is provided. Results from this study are expected to contribute to the annual updates to the *Lista de Espécies da Flora do Brasil*, and to assess the IUCN status of each species, which is important for future conservation planning and management in Brazil.

MATERIALS AND METHODS

The study area is located in the region of northeastern Brazil (Figure 1), which encompasses a number of unique biomes (*e.g.*, Amazonian and Atlantic forests, Caatinga, and Cerrado dominia) and habitats in the states of Alagoas (AL), Ceará (CE), Paraíba (PB), Pernambuco (PE), Piauí (PI), Rio Grande do Norte (RN), and Sergipe (SE). There are two more states in the northeastern Brazil (BA-Bahia and MA-Maranhão), however, due to several taxonomic problems involving many taxa, these two states had not been herein included.

Plant specimen studies were carried out in local (ASE, EAC, EAN, HST, HVASF, IPA, JPB, MAC, PEUFR, UFP, UFRN, TEPB), national (CEPEC, HUEFS, INPA, RB), and international (G, K, MO, NY, P) herbaria (acronyms according to Thiers 2011). In addition, field research was conducted in several areas during March 2007 to June 2011 in Atlantic Rainforest and Caatinga biomes as part of a broader taxonomic study of the genus *Pouteria* Aubl. (Alves-Araújo *et al*., unpublished data).

Voucher specimens were identified following descriptions and keys published by Pennington (1990) and Almeida Jr. (2010). Further comparison with type specimens helped to verify species concepts. Species

FIGURE 1. Study area (Grey area)– Map of the Northeastern Brazil (excluding Bahia– BA and Maranhão – MA states). States: AL – Alagoas; CE – Ceará; PB – Paraíba; PE – Pernambuco; PI – Piauí; RN – Rio Grande do Norte; SE – Sergipe.

nomenclature in *Pouteria* Aubl. follows Alves-Araújo *et al*. (unpublished data).When possible, species vernacular names obtained from herbarium specimen labels, literature, and local informants are included in parentheses next to scientific names. Information about the geographic distribution, biome of occurrence, voucher specimens, and conservation status based on IUCN Red List criteria (2012) is provided for each species. New species records for the region are marked by an asterisk (*) following their occurrence by state.

Results and discussion

This work expands the known distribution of many native Sapotaceae species from selected states of the Brazilian northeastern region and it includes new records for a number of states. A total of nine genera and 46 species of Sapotaceae are documented from the study area instead of previously cited 35 species, according to Carneiro *et al.* (2012). *Pouteria* Aubl. was the most diverse genus with 18 species, followed by *Chrysophyllum* L. and *Manilkara* Adans. (7 spp. each) and *Micropholis* (Griseb.) Pierre (6 spp.). The majority of species (30) occur exclusively in the Atlantic rainforest, confirming the notion that moist forest environments harbor the highest species diversity (Pennington 2006). *Chrysophyllum arenarium* Allemão, *Manilkara rufula* (Miq.) H.J. Lam., *Micropholis gnaphaloclados* (Mart.) Pierre, *Pouteria glomerata* (Miq.) Radlk. subsp. *glomerata*, *Pouteria gardneriana* (A. DC.) Radlk., and *Sideroxylon obtusifolium* (Roem. and Schult.) T.D. Penn. are all restricted to the Caatinga biome. *Micropholis gardneriana* (A. DC.) Pierre and *Pouteria reticulata* (Engl.) Eyma occur in both Atlantic rainforest and Caatinga biomes. *Chrysophyllum sparsiflorum* Klotzsch ex Miq., *Manilkara cavalcantei* Pires and Rodrigues ex T.D. Penn., *Pouteria plicata* T.D. Penn., and *Pradosia surinamensis* (Eyma) T.D. Penn. are exclusively recorded for Amazonian dominium. *Pouteria furcata* T.D. Penn. has been known to be a common species from the Cerrado biome of the state of Piauí, however, herein it is also documented to occur in Caatinga. The same is true for *Pouteria ramiflora* (Mart.) Radlk., which is usually found in Cerrado of central Brazil and herein constitutes a new species record for Atlantic rainforest in the state of Ceará.

Checklist of Sapotaceae in Northeastern Brazil

***Chrysophyllum arenarium* Allemão** (Ameixa, Mamão-de-bode)
Occurrence states: CE, PE, PI (Caatinga)
Voucher: I. Costa 244 (EAC).
IUCN Conservation Status: **VU (B1+2c)**

***Chrysophyllum gonocarpum* (Mart. and Eich. ex Miq.) Engl.** (Aguaí)
Occurrence states: CE, PE, RN (Atlantic rainforest)
Voucher: A. Fernandes and E. Nunes (EAC-9935).
IUCN Conservation Status: **LC**

***Chrysophyllum lucentifolium* Cronq.**
Occurrence state: SE* (Atlantic rainforest)
Voucher: C. Farney and J.S. Gomes 3013 (ASE).
IUCN Conservation Status: **LC**

***Chrysophyllum marginatum* (Hook. and Arn.) Radlk.**
Occurrence states: AL*, CE*, PE* (Atlantic rainforest)
Voucher: A. Fernandes and Matos (EAC).
IUCN Conservation Status: **LC**

***Chrysophyllum rufum* Mart.** (Murici-de-tabuleiro)
Occurrence states: AL, CE, PB, PE, SE (Atlantic rainforest)
Voucher: A. Alves-Araújo 1320 (UFP).
IUCN Conservation Status: **LC**

***Chrysophyllum sparsiflorum* Klotzsch ex Miq.** (Mangabarana, Abiu-ucuba)
Occurrence states: PI* (Amazônia, Cerrado)
Voucher: D. Sucre 9447 (RB, NY).
IUCN Conservation Status: **LC**

***Chrysophyllum splendens* Spreng.** (Asa-de-morcego)
Occurrence states: AL, CE*, PB*, PE (Atlantic rainforest)
Voucher: A. Alves-Araújo 1135 (UFP).
IUCN Conservation Status: **LC**

***Diploon cuspidatum* (Hoehne) Cronquist** (Batinga roxa)
Occurrence states: AL, CE*, PB*, PE (Atlantic rainforest)
Voucher: A. Alves-Araújo 1237 (UFP).
IUCN Conservation Status: **LC**

***Ecclinusa ramiflora* Mart.** (Abiurana)
Occurrence states: AL, PB, PE, SE (Atlantic rainforest)
Voucher: M. Monteiro 21798 (HST).
IUCN Conservation Status: **LC**

***Manilkara cavalcantei* Pires and Rodrigues ex T.D. Penn.** (Maçaranduba)
Occurrence state: PI (Amazônia)
Voucher: E. Almeida Jr. and F. Santos-Filho 855 (PEUFR).
IUCN Conservation Status: **VU (B1+2c)**

***Manilkara dardanoi* Ducke** (Maçaranduba)
Occurrence state: PE (Atlantic rainforest)
Voucher: E. Almeida Jr. and P. Lima 834 (IPA).
IUCN Conservation Status: **VU (B1+2c)**

***Manilkara maxima* T.D. Penn.** (Maçaranduba)
Occurrence state: SE* (Atlantic rainforest)
Voucher: L. A. Gomes *et al*. 317 (ASE).
IUCN Conservation Status: **VU (B1+2c)**

***Manilkara rufula* (Miq.) H.J. Lam** (Maçaranduba)
Occurrence states: AL, CE, PB, PE, PI, RN, SE (Caatinga)
Voucher: A. Alves-Araújo 1317 (UFP).
IUCN Conservation Status: **LC**

***Manilkara salzmannii* (A. DC.) H.J. Lam** (Maçaranduba)
Occurrence states: AL, CE, PB, PE, PI, RN, SE (Atlantic rainforest)
Voucher: A. Alves-Araújo 1334 (UFP).
IUCN Conservation Status: **LC**

***Manilkara triflora* (Allemão) Monach.** (Maçaranduba)
Occurrence states: CE, PI, RN (Caatinga, Cerrado, Atlantic rainforest)

Voucher: E. Almeida Jr. *et al*. 325 (PEUFR).
IUCN Conservation Status: **LC**

***Manilkara zapota* (L.) P. Royen** (Sapoti)
Occurrence states: AL*, CE, PB, PE, PI, RN*, SE (Atlantic rainforest)
Voucher: A. Alves-Araújo 1299 (UFP).
IUCN Conservation Status: **LC**

***Micropholis compta* Pierre**
Occurrence states: AL*, PE (Atlantic rainforest)
Voucher: A. Alves-Araújo 1236 (UFP).
IUCN Conservation Status: **LC**

***Micropholis emarginata* T.D. Penn.**
Occurrence state: SE* (Atlantic rainforest)
Voucher: M. Fonseca s/n (ASE-499).
IUCN Conservation Status: **DD**

***Micropholis gardneriana* (A. DC.) Pierre**
Occurrence states: PE, PI*, SE (Caatinga, Atlantic rainforest)
Voucher: D. Andrade-Lima 57-2835 (IPA).
IUCN Conservation Status: **LC**

***Micropholis gnaphaloclados* (Mart.) Pierre**
Occurrence state: PE (Caatinga)
Voucher: M. Gardner 2911 (K).
IUCN Conservation Status: **LC**

***Micropholis guyanensis* (A. DC.) Pierre**
Occurrence state: AL* (Atlantic rainforest)
Voucher: N. Mendonça 442 (MAC).
IUCN Conservation Status: **LC**

***Micropholis venulosa* (Mart. and Eich. ex Miq.) Pierre**
Occurrence states: AL*, SE* (Atlantic rainforest)
Voucher: N. Mendonça 303 (MAC).
IUCN Conservation Status: **LC**

***Pouteria bangii* (Rusby) T.D. Penn.** (Abiu-rosadinha, Leiteiro)
Occurrence states: AL, CE*, PB, PE, RN, SE* (Atlantic rainforest)
Voucher: A. Alves-Araújo 1181 (UFP).
IUCN Conservation Status: **LC**

***Pouteria caimito* (Ruiz and Pav.) Radlk.** (Abiu)
Occurrence states: AL*, CE, PB, PE, RN*, SE* (Atlantic rainforest)
Voucher: A. Alves-Araújo 1337 (UFP).
IUCN Conservation Status: **LC**

***Pouteria ciliata* Alves-Araújo and M.Alves**
Occurrence states: CE, PE (Atlantic rainforest)
Voucher: T. Silva and K. Almeida 67 (PEUFR).
IUCN Conservation Status: **VU (A1c, D2)**

Pouteria durlandii* (Standl.) Baehni *subsp. durlandii (Bapeba)
Occurrence states: AL, PB*, PE* (Atlantic rainforest)
Voucher: A. Alves-Araújo 1331 (UFP).
IUCN Conservation Status: **LC**

***Pouteria egregia* Sandwith**
Occurrence state: PE* (Atlantic rainforest)
Voucher: S. Freire and H. Silva 19 (PEUFR).
IUCN Conservation Status: **LC**

***Pouteria furcata* T.D. Penn.** (Tuturuba)
Occurrence state: PI (Caatinga, Cerrado)
Voucher: R. Santos *et al*. 1483 (HUEFS).
IUCN Conservation Status: **VU (B1+2c)**

***Pouteria gallifructa* Cronq.** (Bucho-de-veado)
Occurrence states: AL*, PE, SE* (Atlantic rainforest)
Voucher: A. Alves-Araújo 1136 (UFP).
IUCN Conservation Status: **VU (A2bcd)**

***Pouteria gardneri* (Mart. and Miq.) Baehni** (Leiteiro-preto)
Occurrence states: AL, CE*, PB*, PE*, SE* (Atlantic rainforest)
Voucher: A. Alves-Araújo 1142 (UFP).
IUCN Conservation Status: **LC**

***Pouteria gardneriana* (A. DC.) Radlk.** (Aguaí)
Occurrence states: AL*, PE, RN (Caatinga)
Voucher: A. Roque 17 (JPB).
IUCN Conservation Status: **LC**

Pouteria glomerata* (Miq.) Radlk. *subsp. glomerata (Abiurana)
Occurrence states: AL, CE, PE, SE (Caatinga)
Voucher: M. Gardner 1352 (K).
IUCN Conservation Status: **LC**

***Pouteria macahensis* T.D. Penn.** (Maçaranduba-mirim)
Occurrence states: AL*, PE*, SE* (Atlantic rainforest)
Voucher: A. Alves-Araújo 1009 (UFP).
IUCN Conservation Status: **VU (A1bcd, B2)**

***Pouteria macrophylla* (Lam.) Eyma** (Abiurana)
Occurrence state: CE* (Atlantic rainforest)
Voucher: A. Castro 1624 (EAC).
IUCN Conservation Status: **LC**

***Pouteria nordestinensis* Alves-Araújo and M.Alves** (Bapeba)
Occurrence states: AL, CE, PB*, PE, SE (Atlantic rainforest)
Voucher: A. Alves-Araújo 1080 (UFP).
IUCN Conservation Status: **VU (A2c, B1)**

***Pouteria plicata* T.D. Penn.** (Juturuba)
Occurrence state: PI (Amazônia, Caatinga)
Voucher: B. Dahlgren 821 (G).
IUCN Conservation Status: **LC**

***Pouteria procera* (Mart.) Radlk.** (Maparajuba, Maparajuba-vermelha)
Occurrence state: PI* (Amazônia)
Voucher: A. Moura 251A (JPB).
IUCN Conservation Status: **LC**

***Pouteria ramiflora* (Mart.) Radlk.** (Bacumixá, Pitomba-de-leite)
Occurrence states: CE, PE, PI, SE* (Caatinga, Cerrado, Atlantic rainforest)
Voucher: A. Alves-Araújo 1330 (UFP).
IUCN Conservation Status: **LC**

***Pouteria reticulata* (Engl.) Eyma** (abiurana-preta)
Occurrence states: AL*, CE, PE*, PI, RN* (Atlantic rainforest, Caatinga)
Voucher: A. Castro 1868 (EAC).
IUCN Conservation Status: **LC**

***Pouteria venosa* (Mart.) Baehni *subsp. amazonica* T.D. Penn.** (Bapeba)
Occurrence states: AL*, PB, PE, RN, SE* (Atlantic rainforest)
Voucher: A. Alves-Araújo 1336 (UFP).
IUCN Conservation Status: **LC**

***Pradosia lactescens* (Vell.) Radlk.** (Buranhém, Mama-de-cachorro)
Occurrence states: AL, PB, PE, RN*, SE* (Atlantic rainforest)
Voucher: A. Alves-Araújo 998 (UFP).
IUCN Conservation Status: **LC**

***Pradosia verrucosa* Ducke**
Occurrence states: AL*, PE (Atlantic rainforest)
Voucher: R. Lyra-Lemos 7698 (MAC).
IUCN Conservation Status: **EN (A1+B1+D1)**

***Pradosia surinamensis* (Eyma) T.D. Penn.**
Occurrence state: PI* (Amazônia)
Voucher: A. Fernandes s/n (INPA- 92382).
IUCN Conservation Status: **DD**

Pradosia sp. nov.
Occurrence states: RN*, SE* (Atlantic rainforest)
Voucher: A. Alves-Araújo 1373 (UFP, INPA).
IUCN Conservation Status: **DD**

***Sarcaulus brasiliensis* (A. DC.) Eyma**
Occurrence states: AL*, PB*, PE, RN (Atlantic rainforest)
Voucher: M. Barbosa 1488 (JPB).
IUCN Conservation Status: **LC**

***Sideroxylon obtusifolium* (Humb. ex Roem. and Schult.) T.D. Penn.** (Quixaba)
Occurrence states: AL, CE, PB, PE, PI, RN, SE (Caatinga)
Voucher: A. Alves-Araújo 1015 (UFP).
IUCN Conservation Status: **LC**

Pernambuco and Alagoas, with 32 and 26 species, respectively, were the richest states, followed by Sergipe (21 spp.), Ceará (20 spp.), Paraíba and Piauí (16 spp. each), and Rio Grande do Norte (14 spp.). The high diversity of the Sapotaceae in Pernambuco and Alagoas was expected, since both states comprise the largest Atlantic Rainforest remnants in northeastern Brazil (excluding Bahia) (Mittermeier *et al*. 1999; Myers *et al*. 2000). Previous estimates of Sapotaceae species diversity in Brazil by Carneiro *et al*. (2012) included the state of Bahia, which is one of the richest states in the region due to the presence of many moist rainforests remnants. Because of several taxonomic problems with various Sapotaceae genera in Bahia, the state was excluded from this study and should be a focus of future studies, the same for Maranhão state. Nevertheless, the current work advances our state of knowledge of the Sapotaceae of northeastern Brazil. The results of this study point out more than half of the species previously registered for the region, which lead us to think the possibility that total species richness has been drastically underestimated. Collaborative efforts in the region should focus on to document the flora through local and regional studies of model plant families such as the Sapotaceae. Clearly, an accurate accounting of the flora of this region is essential for wise conservation and management endeavours.

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